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PRADEEP SINDHU

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EXAMINER

YAO, KWANG BIN

ART UNIT

PAPER NUMBER

2667

DATE MAILED: 08/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/448,124

Applicant(s)

SINDHU ET AL.

Examiner

Kwang B. Yao

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 June 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 44-87 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 44-52,54,56,58,66-73,78 and 80-87 is/are rejected.
- 7) ☒ Claim(s) 53,55,57,59-65,74-77 and 79 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 44-87 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

2. Claim 80 is rejected as failing to define the invention in the manner required by 35 U.S.C. 112, second paragraph.

The claim is narrative in form and do not contain positively recited steps of a specific process. Note that method claim should set forth a series of steps in the active tense in an instruction-like manner thereby reciting an actual method. Ex parte ERLICH, 3USPQ2d 1011 at 1017[6].

3. Claim 85 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 85, "n", "k", "m" are undefined.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

5. Claims 44-49, 68-70, 80-84, 86 are rejected under 35 U.S.C. 102(e) as being anticipated by McKeown et al. (US 6,647,019).

McKeown et al. discloses a communication system comprising the following features: regarding claim 44, in a system for transferring data packets, where the system includes a plurality of line cards (Fig. 3, Linecard 330a, 330z), a line card comprising: a request generator to generate a request signal (Fig. 7) to be transmitted to a destination line card (Fig. 3, Linecard 330z) in order to receive a grant signal (Fig. 8) authorizing transferring of data to the destination line card (Fig. 3, Linecard 330z); a data cell transmitter to transmit a data cell to the destination line card (Fig. 3, Linecard 330z) upon receipt of the grant signal (Fig. 8) from the destination card; and transmit logic to receive a grant signal (Fig. 8) and a data cell which are unrelated (column 13, lines 23-28 and lines 49-52) to each other from a grant generator and the data cell transmitter, respectively, and transmit the grant signal (Fig. 8) and the data cell together (column 13, lines 12-64) in a data transfer unit; regarding claim 45, a switching device for transferring data packets, comprising: one or more source line card (Fig. 3, Linecard 330a)s (Fig. 3, Linecard

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330a, 330z), each including a request generator to generate a request signal (Fig. 7) to be transmitted in order to obtain an authorization to transmit data; one or more destination line card (Fig. 3, Linecard 330z)s (Fig. 3, Linecard 330a, 330z), each including a grant generator to generate and send back a grant signal (Fig. 8) to a source line card (Fig. 3, Linecard 330a) in response to the request signal (Fig. 7) received at a destination line card (Fig. 3, Linecard 330z) to authorize the source line card (Fig. 3, Linecard 330a) to transmit a data cell to the destination line card (Fig. 3, Linecard 330z); and a switching fabric (Fig. 3, Switch Core 320) coupled to the source line card (Fig. 3, Linecard 330a) and the destination line card (Fig. 3, Linecard 330z), the switching fabric (Fig. 3, Switch Core 320) being configured to receive and transmit the request signal (Fig. 7), the grant signal (Fig. 8), and the data cell to the appropriate line cards (Fig. 3, Linecard 330a, 330z), where the switching fabric (Fig. 3, Switch Core 320) is configured to transmit at least two of a request signal (Fig. 7), a grant signal (Fig. 8), or a data cell together (column 13, lines 12-64) in a single data transfer unit; regarding claim 46, wherein the source line card (Fig. 3, Linecard 330a) further includes a data cell transmitter to transmit the data cell upon receiving the grant signal (Fig. 8) from the destination line card (Fig. 3, Linecard 330z); regarding claim 47, wherein the source line card (Fig. 3, Linecard 330a) further includes transmit logic to receive a request signal (Fig. 7) and a data cell which are unrelated (column 13, lines 23-28 and lines 49-52) to each other from the request generator and the data cell transmitter, respectively, and transmit the request signal (Fig. 7) and the data cell together (column 13, lines 12-64) to the switching fabric (Fig. 3, Switch Core 320); regarding claim 48, wherein the source line card (Fig. 3, Linecard 330a) further includes transmit logic to receive a grant signal (Fig. 8) and a data cell which are unrelated (column 13, lines 23-28 and lines 49-52) to each other from

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the grant generator and the data cell transmitter, respectively, and transmit the grant signal (Fig. 8) and the data cell together (column 13, lines 12-64) to the switching fabric (Fig. 3, Switch Core 320); regarding claim 49, wherein the source line card (Fig. 3, Linecard 330a) further includes transmit logic to receive a request signal (Fig. 7) and a grant signal (Fig. 8) which are unrelated (column 13, lines 23-28 and lines 49-52) to each other from the request generator and the grant generator, respectively, and transmit the request signal (Fig. 7) and the grant signal (Fig. 8) together to the switching fabric (Fig. 3, Switch Core 320); regarding claim 68, in a switching device for transferring data packets wherein the switching device includes a plurality of line cards (Fig. 3, Linecard 330a, 330z), a line card comprising: a request generator to generate a request signal (Fig. 7) to be transmitted to a destination line card (Fig. 3, Linecard 330z) in order to receive a grant signal (Fig. 8) authorizing transferring of data to the destination line card (Fig. 3, Linecard 330z); and a data cell transmitter to transmit provide a data cell to be transmitted to the destination line card (Fig. 3, Linecard 330z) upon receipt of the grant signal (Fig. 8) from the destination line card (Fig. 3, Linecard 330z), where a request signal (Fig. 7) and a data cell are transmitted together in a single data transfer unit; regarding claim 69, a switching device for transferring data, comprising: a source line card (Fig. 3, Linecard 330a); a destination line card (Fig. 3, Linecard 330z) including a grant generator to generate and transmit a grant signal (Fig. 8) to the source line card (Fig. 3, Linecard 330a) to authorize the source line card (Fig. 3, Linecard 330a) to transfer data to the destination line card (Fig. 3, Linecard 330z); the source line card (Fig. 3, Linecard 330a) including a data cell transmitter to transfer a data cell to the destination line card (Fig. 3, Linecard 330z) upon receiving the grant signal (Fig. 8) at the source line card (Fig. 3, Linecard 330a); and a switching fabric (Fig. 3, Switch Core 320) coupled to the

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source line card (Fig. 3, Linecard 330a) and the destination line card (Fig. 3, Linecard 330z) for receiving the grant signal (Fig. 8) from the destination line card (Fig. 3, Linecard 330z) and switching the grant signal (Fig. 8) to the source line card (Fig. 3, Linecard 330a), and for receiving the data cell from the source line card (Fig. 3, Linecard 330a) and switching the data cell to the destination line card (Fig. 3, Linecard 330z), where the switching fabric (Fig. 3, Switch Core 320) is configured to transmit a grant signal (Fig. 8) and a data cell together in a single transfer unit; regarding claim 70, a method for transferring data between line cards (Fig. 3, Linecard 330a, 330z) in a router, the router having a plurality of line cards (Fig. 3, Linecard 330a, 330z) and a switching fabric (Fig. 3, Switch Core 320) coupled to the line cards (Fig. 3, Linecard 330a, 330z), the method comprising: transmitting a request signal (Fig. 7) from a source line card (Fig. 3, Linecard 330a) to a destination line card (Fig. 3, Linecard 330z) through the switching fabric (Fig. 3, Switch Core 320); upon receiving the request signal (Fig. 7) at the destination line card (Fig. 3, Linecard 330z), sending a grant signal (Fig. 8) from the destination line card (Fig. 3, Linecard 330z) to the source line card (Fig. 3, Linecard 330a) responsive to the request signal (Fig. 7) to authorize the source line card (Fig. 3, Linecard 330a) to transfer data to the destination line card (Fig. 3, Linecard 330z); transferring a data cell from the source line card (Fig. 3, Linecard 330a) to the destination line card (Fig. 3, Linecard 330z) in response to the grant signal (Fig. 8) received at the source line card (Fig. 3, Linecard 330a), and transferring, by the switching fabric (Fig. 3, Switch Core 320), at least two of a request signal (Fig. 7), a grant signal, or a data cell together (column 13, lines 12-64) in a single data transfer unit; regarding claim 80, in a switching device having a plurality of line cards (Fig. 3, Linecard 330a, 330z) and a switch fabric therebetween for transferring data packets, a method for controlling the transfer

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of data packets through the switching device comprising: transferring data packets and flow control (Fig. 7, request cell; Fig. 8, grant cell) to ether on a same path through the switching device; regarding claim 81, in a switching device having a plurality of line cards (Fig. 3, Linecard 330a, 330z) and a switching fabric (Fig. 3, Switch Core 320) therebetween for transferring data packets, where each line card includes an input section including one or more input ports and an output section including one or more output ports, a method for controlling the transfer of a data packet through the switching device comprising: generating a request flow control (Fig. 7, request cell; Fig. 8, grant cell) message at a source line card (Fig. 3, Linecard 330a) to request authorization for a transfer of the data packet from the source line card (Fig. 3, Linecard 330a) to the destination line card (Fig. 3, Linecard 330z); transferring the request flow control (Fig. 7, request cell; Fig. 8, grant cell) message from the input section of the source line card (Fig. 3, Linecard 330a) to the output section of the destination line card (Fig. 3, Linecard 330z) using the switching fabric (Fig. 3, Switch Core 320); generating a grant flow control (Fig. 7, request cell; Fig. 8, grant cell) message at a destination line card (Fig. 3, Linecard 330z) for the data packet; transferring the grant flow control (Fig. 7, request cell; Fig. 8, grant cell) message from the output section of the destination line card (Fig. 3, Linecard 330z) to the input section of the destination line card (Fig. 3, Linecard 330z); transferring the grant flow control (Fig. 7, request cell; Fig. 8, grant cell) message from the input section of the destination line card (Fig. 3, Linecard 330z) to the output section of the source line card (Fig. 3, Linecard 330a) using the switching fabric (Fig. 3, Switch Core 320); receiving the grant flow control (Fig. 7, request cell; Fig. 8, grant cell) message on the output section of the source line card (Fig. 3, Linecard 330a) and transferring the grant flow control (Fig. 7, request cell; Fig. 8, grant cell) message to

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the input section of the source line card (Fig. 3, Linecard 330a); and upon receipt of the grant flow control (Fig. 7, request cell; Fig. 8, grant cell) message at the input section of the source line card (Fig. 3, Linecard 330a), transferring the data packet from the source line card (Fig. 3, Linecard 330a) to the destination line card (Fig. 3, Linecard 330z) using the switching fabric (Fig. 3, Switch Core 320); regarding claim 82, in a switching device having a plurality of line cards (Fig. 3, Linecard 330a, 330z) and a switching fabric (Fig. 3, Switch Core 320) therebetween for transferring data packets, where each line card includes an input section including one or more input ports and an output section including one or more output ports, a method for controlling the transfer of a data packet through the switching device comprising: generating flow control (Fig. 7, request cell; Fig. 8, grant cell) messages at the source line card (Fig. 3, Linecard 330a) and destination line card (Fig. 3, Linecard 330z) to authorize a transfer of the data packet from the source line card (Fig. 3, Linecard 330a) to the destination line card (Fig. 3, Linecard 330z); and transferring the flow control (Fig. 7, request cell; Fig. 8, grant cell) messages between the source and destination line card (Fig. 3, Linecard 330z)s (Fig. 3, Linecard 330a, 330z) including transferring flow control (Fig. 7, request cell; Fig. 8, grant cell) messages from the input section of a line card to the output section of a different line card using the switching fabric (Fig. 3, Switch Core 320), and transferring flow control (Fig. 7, request cell; Fig. 8, grant cell) messages from the output section of a line card to the input section of a same line card without using the switching fabric (Fig. 3, Switch Core 320); regarding claim 83, in a switching device having a plurality of line cards (Fig. 3, Linecard 330a, 330z) and a switching fabric (Fig. 3, Switch Core 320) therebetween for transferring data packets, a method for controlling the transfer of a data packet through the switching device comprising: generating

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flow control (Fig. 7, request cell; Fig. 8, grant cell) messages at the source line card (Fig. 3, Linecard 330a) and destination line card (Fig. 3, Linecard 330z) to authorize a transfer of the data packet from the source line card (Fig. 3, Linecard 330a) to the destination line card (Fig. 3, Linecard 330z), each flow control (Fig. 7, request cell; Fig. 8, grant cell) message only including a source and destination line card (Fig. 3, Linecard 330z) address; and transferring the flow control (Fig. 7, request cell; Fig. 8, grant cell) messages between the source and destination line card (Fig. 3, Linecard 330z)s (Fig. 3, Linecard 330a, 330z) using the switching fabric (Fig. 3, Switch Core 320) where minimal data buffering (column 13, lines 58-61) is performed by the switching fabric (Fig. 3, Switch Core 320) in processing the flow control (Fig. 7, request cell; Fig. 8, grant cell) messages; regarding claim 84, using a probe cell to arbitrate when the data packet will be transferred including transferring the probe cell from the source line card (Fig. 3, Linecard 330a) to the destination line card (Fig. 3, Linecard 330z) using the switching fabric (Fig. 3, Switch Core 320); regarding claim 86, a switching device for transferring data packets, comprising: one or more source line card (Fig. 3, Linecard 330a)s (Fig. 3, Linecard 330a, 330z), each including a request generator to generate a request signal (Fig. 7) to be transmitted in order to obtain an authorization to transmit data; one or more destination line card (Fig. 3, Linecard 330z)s (Fig. 3, Linecard 330a, 330z), each including a grant generator to generate and send back a grant signal (Fig. 8) to a source line card (Fig. 3, Linecard 330a) in response to the request signal (Fig. 7) received at the destination line card (Fig. 3, Linecard 330z) to authorize the source line card (Fig. 3, Linecard 330a) to transmit a data cell to the destination line card (Fig. 3, Linecard 330z); and a plurality of planes of switching elements coupling the one or more source line card (Fig. 3, Linecard 330a)s (Fig. 3, Linecard 330a, 330z) and the one or more destination

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line card (Fig. 3, Linecard 330z)s (Fig. 3, Linecard 330a, 330z), each plane being connected to the one or more source line card (Fig. 3, Linecard 330a)s (Fig. 3, Linecard 330a, 330z) and the one or more destination line card (Fig. 3, Linecard 330z)s (Fig. 3, Linecard 330a, 330z) and being configured to receive and transmit the request signal (Fig. 7), the grant signal (Fig. 8), and the data cell to the appropriate line cards (Fig. 3, Linecard 330a, 330z). See column 1-16.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 51, 52, 54, 56, 58, 66, 67, 70, 73, 78 are rejected under 35 U.S.C. 103(a) as being unpatentable over McKeown et al. (US 6,647,019) in view of Stevens (US 5,463,486).

McKeown et al. discloses the claimed limitations above. Moreover, McKeown et al. discloses a communication system comprising the following features: regarding claim 67, in a switching device having a plurality of line cards (Fig. 3, Linecard 330a, 330z) and a switch fabric (Fig. 3, Switch Core 320) therebetween for transferring data packets.

McKeown et al. does not disclose the following features: regarding claim 51, wherein the switching fabric further includes: a plurality of first stage crossbars, each first stage crossbar having a plurality of input ports and a plurality of output ports, wherein each of the input ports of the first stage crossbar is connected to a different source line card; a plurality of second stage crossbars, each second stage crossbar having a plurality of input ports and a plurality of output

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ports, wherein an output port of the first stage crossbar is connected to an input port of the second stage crossbar; and a plurality of third stage crossbars, each third stage crossbar having a plurality of input ports and a plurality of output ports, wherein an output port of the second stage crossbar is connected to an input port of the third stage crossbar, wherein each of the output ports of the third stage crossbars are connected to a different destination line card; regarding claim 52, wherein each of the first, second and third stage crossbars includes a plurality of request spray engines, each request spray engine associated with one of the input ports of the crossbars, each request spray engine receiving the request signal and spraying the request signal to one of the output ports in the same crossbar to which the request spray engine is associated; regarding claim 54, wherein each of the first, second and third stage crossbars further includes: a plurality of grant spray engines, each grant spray engine associated with one of the input ports of the crossbars, each grant spray engine receiving the grant signal and spraying the grant signal to one of the output ports in the crossbar to which the request spray engine is associated; regarding claim 56, wherein each of the first, second and third stage crossbars further includes: a plurality of data cell spray engines, each data cell spray engine associated with one of the input ports of the crossbars, each data cell spray engine receiving the data cell and spraying the data cell to one of the output ports in the crossbar to which the data cell spray engine is associated; regarding claim 58, wherein each of the first, second and third stage crossbars includes a plurality of request handlers, each request handler associated with one of the output ports of the crossbars, each request handler receiving the request signal sprayed by any one of the request spray engines in the crossbar to which the request handler is associated; regarding claim 66, wherein the first, second and third stage crossbars further includes: a plurality of grant handlers, each grant

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handler associated with one of the output ports of a crossbar, each grant handler receiving a grant signal sprayed by any one of the grant spray engines in a same crossbar to which the grant handler is associated; and a plurality of data cell handlers, each data cell handler associated with one of the output ports of a crossbar, each data cell handler receiving a data cell sprayed by any one of the data cell spray engines in a same crossbar to which the data cell handler is associated; regarding claim 67, a switch fabric comprising a plurality of first stage crossbars in a first stage, each first stage crossbar having a plurality of input ports and a plurality of output ports, each input port having a first request spray engine to receive a plurality of request signal signals associated with a destination line card and spray the request signals to different ones of the output ports in the same first stage crossbar; a plurality of second stage crossbars in a second stage, each second stage crossbar having a plurality of input ports and a plurality of output ports, each input port having a second request spray engine to receive one of the request signals from one of the first stage crossbars and send the request signal to one of the output ports in the same second stage crossbar; and a plurality of third stage crossbars in a third stage, each third stage crossbar having a plurality of input ports and a plurality of output ports, each input port having a third request spray engine to receive one of the request signals from one of the second stage crossbars and spray send the request signal to one of the output ports in the same third stage crossbar; regarding claim 73, wherein the switching fabric is in a three stage Clos topology having a plurality of first stage crossbars in a first stage, a plurality of second stage crossbars in a second stage and a plurality of third stage crossbars in a third stage, the method further comprising: transmitting the request signal from the source line card to one of the first stage crossbars; selecting one of the second stage crossbars to switch the request signal; switching the

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request signal to the selected second stage crossbar; determining which one of the third stage crossbars to direct the request signal according to the destination line card to where the request signal is to be sent; directing the request signal to the determined third stage crossbar; determining which one of the line cards coupled to the determined crossbar to transfer the request signal; and transferring the request signal to the determined line card; regarding claim 78, wherein the switching fabric is in a three stage Clos topology, a plurality of first stage crossbars in a first stage, a plurality of second stage crossbars in a second stage and a plurality of third stage crossbars in a third stage, wherein transferring the data cell from the source line card to the destination line card further comprises: transmitting the data cell from the source line card to one of the first stage crossbars; selecting one of the second stage crossbars to where the data cell is to be switched; switching the data cell to the selected second stage crossbar; determining which one of the third stage crossbars to direct the data cell according to the destination line card to where the data cell is to be sent; directing the data cell to the determined third stage crossbar; determining which one of the line cards coupled to the determined third stage crossbar to transfer the data cell according to the destination line card to where the data cell is to be sent; and transferring the data cell to the determined line card.

Stevens discloses a communication system comprising the following features: regarding claim 51, wherein the switching fabric further includes: a plurality of first stage crossbars (FIG. 6, first stage 100), each first stage crossbar having a plurality of input ports (Fig. 3, inputs 71, 72, 73, 74) and a plurality of output ports (FIG. 3, outputs 75, 76, 77, 78), wherein each of the input ports (Fig. 3, inputs 71, 72, 73, 74) of the first stage crossbar is connected to a different source line card; a plurality of second stage crossbars (FIG. 6, second stage 102), each second stage

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crossbar having a plurality of input ports (Fig. 3, inputs 71, 72, 73, 74) and a plurality of output ports (FIG. 3, outputs 75, 76, 77, 78), wherein an output port (FIG. 3, output 75) of the first stage crossbar is connected to an input port (Fig. 3, input 71) of the second stage crossbar; and a plurality of third stage crossbars (FIG. 6, third stage 103), each third stage crossbar having a plurality of input ports (Fig. 3, inputs 71, 72, 73, 74) and a plurality of output ports (FIG. 3, outputs 75, 76, 77, 78), wherein an output port (FIG. 3, output 75) of the second stage crossbar is connected to an input port (Fig. 3, input 71) of the third stage crossbar, wherein each of the output ports (FIG. 3, outputs 75, 76, 77, 78) of the third stage crossbars (FIG. 6, third stage 103) are connected to a different destination line card; regarding claim 52, wherein each of the first, second and third stage crossbars (FIG. 6, third stage 103) includes a plurality of request spray engine (FIG. 3, SWITCH 70)s, each request spray engine (FIG. 3, SWITCH 70) associated with one of the input ports (Fig. 3, inputs 71, 72, 73, 74) of the crossbars, each request spray engine (FIG. 3, SWITCH 70) receiving the request signal (Fig. 10, REQUEST-1) and spraying the request signal (Fig. 10, REQUEST-1) to one of the output ports (FIG. 3, outputs 75, 76, 77, 78) in the same crossbar to which the request spray engine (FIG. 3, SWITCH 70) is associated; regarding claim 54, wherein each of the first, second and third stage crossbars (FIG. 6, third stage 103) further includes: a plurality of grant spray engine (FIG. 3, SWITCH 70)s, each grant spray engine (FIG. 3, SWITCH 70) associated with one of the input ports (Fig. 3, inputs 71, 72, 73, 74) of the crossbars, each grant spray engine (FIG. 3, SWITCH 70) receiving the grant signal and spraying the grant signal to one of the output ports (FIG. 3, outputs 75, 76, 77, 78) in the crossbar to which the request spray engine (FIG. 3, SWITCH 70) is associated; regarding claim 56, wherein each of the first, second and third stage crossbars (FIG. 6, third stage 103) further

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:includes: a plurality of data cell spray engine (FIG. 3, SWITCH 70)s, each data cell spray engine (FIG. 3, SWITCH 70) associated with one of the input ports (Fig. 3, inputs 71, 72, 73, 74) of the crossbars, each data cell spray engine (FIG. 3, SWITCH 70) receiving the data cell and spraying the data cell to one of the output ports (FIG. 3, outputs 75, 76, 77, 78) in the crossbar to which the data cell spray engine (FIG. 3, SWITCH 70) is associated; regarding claim 58, wherein each of the first, second and third stage crossbars includes a plurality of request handlers, each request handler associated with one of the output ports of the crossbars, each request handler receiving the request signal sprayed by any one of the request spray engines (FIG. 3, SWITCH 70) in the crossbar to which the request handler is associated; regarding claim 66, wherein the first, second and third stage crossbars (FIG. 6, third stage 103) further includes: a plurality of grant handlers, each grant handler associated with one of the output ports (FIG. 3, outputs 75, 76, 77, 78) of a crossbar, each grant handler receiving a grant signal sprayed by any one of the grant spray engine (FIG. 3, SWITCH 70)s in a same crossbar to which the grant handler is associated; and a plurality of data cell handlers (FIG. 3, DECODE 81, 82, 83, 84), each data cell handler associated with one of the output ports (FIG. 3, outputs 75, 76, 77, 78) of a crossbar, each data cell handler receiving a data cell sprayed by any one of the data cell spray engine (FIG. 3, SWITCH 70)s in a same crossbar to which the data cell handler is associated; regarding claim 67, a switch fabric comprising a plurality of first stage crossbars (FIG. 6, first stage 100) in a first stage, each first stage crossbar having a plurality of input ports (Fig. 3, inputs 71, 72, 73, 74) and a plurality of output ports (FIG. 3, outputs 75, 76, 77, 78), each input port (Fig. 3, input 71) having a first request spray engine (FIG. 3, SWITCH 70) to receive a plurality of request signal (Fig. 10, REQUEST-1) signals associated with a destination line card and spray

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the request signals (Fig. 10, REQUEST-1) to different ones of the output ports (FIG. 3, outputs 75, 76, 77, 78) in the same first stage crossbar; a plurality of second stage crossbars (FIG. 6, second stage 102) in a second stage, each second stage crossbar having a plurality of input ports (Fig. 3, inputs 71, 72, 73, 74) and a plurality of output ports (FIG. 3, outputs 75, 76, 77, 78), each input port (Fig. 3, input 71) having a second request spray engine (FIG. 3, SWITCH 70) to receive one of the request signals (Fig. 10, REQUEST-1) from one of the first stage crossbars (FIG. 6, first stage 100) and send the request signal (Fig. 10, REQUEST-1) to one of the output ports (FIG. 3, outputs 75, 76, 77, 78) in the same second stage crossbar; and a plurality of third stage crossbars (FIG. 6, third stage 103) in a third stage, each third stage crossbar having a plurality of input ports (Fig. 3, inputs 71, 72, 73, 74) and a plurality of output ports (FIG. 3, outputs 75, 76, 77, 78), each input port (Fig. 3, input 71) having a third request spray engine (FIG. 3, SWITCH 70) to receive one of the request signals (Fig. 10, REQUEST-1) from one of the second stage crossbars (FIG. 6, second stage 102) and spray send the request signal (Fig. 10, REQUEST-1) to one of the output ports (FIG. 3, outputs 75, 76, 77, 78) in the same third stage crossbar; regarding claim 73, wherein the switching fabric is in a three stage Clos topology having a plurality of first stage crossbars (FIG. 6, first stage 100) in a first stage, a plurality of second stage crossbars (FIG. 6, second stage 102) in a second stage and a plurality of third stage crossbars (FIG. 6, third stage 103) in a third stage, the method further comprising: transmitting the request signal (Fig. 10, REQUEST-1) from the source line card to one of the first stage crossbars (FIG. 6, first stage 100); selecting one of the second stage crossbars (FIG. 6, second stage 102) to switch the request signal (Fig. 10, REQUEST-1); switching the request signal (Fig. 10, REQUEST-1) to the selected second stage crossbar; determining which one of the third stage

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crossbars (FIG. 6, third stage 103) to direct the request signal (Fig. 10, REQUEST-1) according to the destination line card to where the request signal (Fig. 10, REQUEST-1) is to be sent; directing the request signal (Fig. 10, REQUEST-1) to the determined third stage crossbar; determining which one of the line cards coupled to the determined crossbar to transfer the request signal (Fig. 10, REQUEST-1); and transferring the request signal (Fig. 10, REQUEST-1) to the determined line card; regarding claim 78, wherein the switching fabric is in a three stage Clos topology, a plurality of first stage crossbars (FIG. 6, first stage 100) in a first stage, a plurality of second stage crossbars (FIG. 6, second stage 102) in a second stage and a plurality of third stage crossbars (FIG. 6, third stage 103) in a third stage, wherein transferring the data cell from the source line card to the destination line card further comprises: transmitting the data cell from the source line card to one of the first stage crossbars (FIG. 6, first stage 100); selecting one of the second stage crossbars (FIG. 6, second stage 102) to where the data cell is to be switched; switching the data cell to the selected second stage crossbar; determining which one of the third stage crossbars (FIG. 6, third stage 103) to direct the data cell according to the destination line card to where the data cell is to be sent; directing the data cell to the determined third stage crossbar; determining which one of the line cards coupled to the determined third stage crossbar to transfer the data cell according to the destination line card to where the data cell is to be sent; and transferring the data cell to the determined line card. See column 1-8. It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the system of McKeown et al., by using the features, as taught by Stevens, in order to provide an efficient data communication without the use of separate paths for control signals. See Stevens, column 2, lines 13-19.

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8. Claims 50, 71, 72, 87 are rejected under 35 U.S.C. 103(a) as being unpatentable over McKeown et al. (US 6,647,019) in view of Cisnero (US 5,157,654).

McKeown et al. discloses the claimed limitations above. Moreover, McKeown et al. discloses a communication system comprising the following features: regarding claim 87, in a switching device including one or more source line cards and destination line cards (Fig. 3, Linecard 330a, 330z), the switching device (Fig. 3, Switch Core 320) for transferring data packets through a network.

McKeown et al. does not disclose a communication system comprising the following features: regarding claim 50, wherein the switching fabric includes a plurality of planes, each plane being coupled to the source line card and the destination line card to receive and switch the request signal, the grant signal and the data cell to an appropriate one of the source line card or the destination line card; regarding claim 71, wherein the switching fabric includes a plurality of planes, the method further comprising: transmitting the request signal to one of the planes; and sending the grant signal from the destination line card to the source line card in response to the request signal received at the destination line card from one of the planes; regarding claim 72, sending the grant signal from the destination line card to the same plane from which the request signal arrived; regarding claim 87, a method for recovering from a failure in the switching device comprising: providing plural switching planes between each source line card and destination line card; generating flow control messages for authorizing a transfer of a packet from a source line card to a destination line card; spraying the flow control messages over each of the plural switching planes; and spraying data packets over switching planes on which flow control authorization messages are received.

Cisnero discloses a communication system comprising the following features: regarding claim 50, wherein the switching fabric includes a plurality of planes (FIG. 20, SELF-ROUTING CROSS-POINT PLANE 2050), each plane (FIG. 20, SELF-ROUTING CROSS-POINT PLANE 2050) being coupled to the source line card (FIG. 20, INPUT MODULE 2010) and the destination line card (FIG. 20, OUTPUT MODULE 2090) to receive and switch the request signal, the grant signal and the data cell to an appropriate one of the source line card (FIG. 20, INPUT MODULE 2010) or the destination line card (FIG. 20, OUTPUT MODULE 2090); regarding claim 71, wherein the switching fabric includes a plurality of planes (FIG. 20, SELF-ROUTING CROSS-POINT PLANE 2050), the method further comprising: transmitting the request signal to one of the planes (FIG. 20, SELF-ROUTING CROSS-POINT PLANE 2050); and sending the grant signal from the destination line card (FIG. 20, OUTPUT MODULE 2090) to the source line card (FIG. 20, INPUT MODULE 2010) in response to the request signal received at the destination line card (FIG. 20, OUTPUT MODULE 2090) from one of the planes (FIG. 20, SELF-ROUTING CROSS-POINT PLANE 2050); regarding claim 72, sending the grant signal from the destination line card (FIG. 20, OUTPUT MODULE 2090) to the same plane (FIG. 20, SELF-ROUTING CROSS-POINT PLANE 2050) from which the request signal arrived; regarding claim 87, a method for recovering from a failure in the switching device comprising: providing plural switching planes (FIG. 20, SELF-ROUTING CROSS-POINT PLANE 2050) between each source line card (FIG. 20, INPUT MODULE 2010) and destination line card (FIG. 20, OUTPUT MODULE 2090); generating flow control messages for authorizing a transfer of a packet from a source line card (FIG. 20, INPUT MODULE 2010) to a destination line card (FIG. 20, OUTPUT MODULE 2090); spraying the flow control messages over each of

the plural switching planes (FIG. 20, SELF-ROUTING CROSS-POINT PLANE 2050); and spraying data packets over switching planes (FIG. 20, SELF-ROUTING CROSS-POINT PLANE 2050) on which flow control authorization messages are received. See column 1-51. It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the system of McKeown et al., by using the features, as taught by Cisnero, in order to provide a reliable communication system by possessing a small failure group size in the event of a failure of an input or output module. See Cisnero, column 9, lines 10-34.

Allowable Subject Matter

9. Claim 85 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.
10. Claims 53, 55, 57, 59-65, 74-77, 79 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO**

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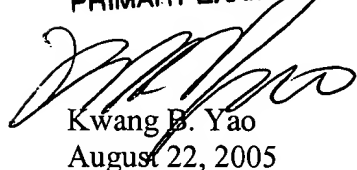
MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kwang B. Yao whose telephone number is 571-272-3182. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chi H. Pham can be reached on 571-272-3179. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KWANG BIN YAO
PRIMARY EXAMINER



Kwang B. Yao
August 22, 2005